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**The Influence of Attitude Priming and Social Responsibility on
the Valuation of Environmental Public Goods Using Paired Comparisons**

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Abstract

Determining the value of an environmental public good, such as litigation over oil-spill damage to a beach is an abstract and difficult task. Integration of economics and psychology enabled the study of how social responsibility and persuasive priming influenced the valuations of environmental public goods. Research subjects were 460 university students randomly assigned to one of six combinations of social responsibility and either a negative, neutral, or positive priming editorial about the environment. Participants completed an interactive computer program in which the items were either environmental public goods (e.g., *wildlife refuge*, *clean air*) private goods of known market value (e.g., \$15 *meal*, \$500 *airline ticket*) or sums of money ranging from \$1 to \$9000. Results indicated the values derived for the environmental public goods were higher when participants had sole responsibility for the group outcome, but were not affected by priming editorials, even though the editorials affected subsequent attitudes.

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*The first step is to measure whatever can be easily measured.
This is okay as far as it goes.
The second step is to disregard that which can't be measured or
give it an arbitrary quantitative value.
This is artificial and misleading.
The third step is to presume that what can't be measured easily really isn't very important.
This is blindness.
The fourth step is to say that what can't be easily measured really doesn't exist.
This is suicide.*

*-- Daniel Yankelovich
(Smith , 1972)*

Advocates of environmental objectives often promote the preservation of natural resources because they have value above and beyond what could be derived through commercial exploitation. Yet there are times when decision-makers need to attach some sort of market value to these resources. Economists refer to these non-market resources as *public goods*, in contrast to *private goods* that can be bought and sold in the marketplace.

Several troubling yet important policy questions require monetary valuation of our environmental public goods. Methods used include natural resource damage assessment in cases of litigation, benefit/cost analysis of environmental management alternatives, economic impact assessment, and evaluation of the human causes and consequences of ecosystem changes. These and other important resource decisions may hinge on knowledge of the value people place on public environmental goods, yet because the market fails to include valid, complete, and credible information about aesthetic value, bequest value, existence value, and the like, what the market tells us about these types of evaluations may be biased and misleading. The result may be inefficiency in the allocation and use of these resources. Furthermore, some people and cultures hold environmental values that may not be amenable to monetary valuation by any method (e.g.,

isolated, indigenous tribes who use a barter system to obtain goods and services). Therefore, other ways to include such values in decision-making and analysis must be used.

Economists have developed a commonly used valuation method for measuring the value of goods that are not bought and sold in a market, such as visibility in a national park or viability of native populations of anadromous fish in a river. This method for estimating non-market values, especially the so-called “non-use” or “passive use” value, is called the *contingent value method* (CVM). This method involves the use of sample surveys (questionnaires) to elicit and assess the willingness of respondents to pay for (generally) hypothetical projects or programs. An example might be asking taxpayers how much they would be willing to increase a sales or property tax to protect a wildlife habitat.

However, CVM is not fully accepted in some policy circles and among some economists (Arrow et al., 1993; Cambridge Economics, 1992; Portney, 1994). For example, valuing of goods is usually couched in terms of neoclassical microeconomic theory, which assumes that economic choices follow the postulate of rationality. Economists interpret such “global rationality” to mean, among other things, that the value of a good is approximately the same whether one is buying or selling. Yet with CVM it is almost always the case that the value of a good derived from willingness to accept (WTA) payment for its loss is higher than its value derived from willingness to pay (WTP) to acquire it (e.g., Boyce et al., 1992). Psychologists believe that loss aversion (our desire to avoid losses) explains this differential. Having a participant “choose” among alternative contingencies can help avoid the WTA/WTP discrepancy (Kahneman et al., 1990; see Kahneman et al. (1993) for a further critique of CVM from a psychological perspective).

The integration of economics and psychology for the task of non-market valuation with focus on comparative judgment offers promise as an opportunity to develop a better understanding of economic decision-making and may be useful in situations where more traditional valuation approaches are problematic. Economic decision-making is, after all, a psychological phenomenon. While economics provides a deductive theory based on observation

of what Herbert Simon (1985) termed “bounded rationality” of human valuation behavior (i.e., the discrepancy between the perfect human rationality that is assumed in neoclassical economic theory and the reality of human behavior as observed in psychology); there exists a need to explore how people behave in a decision-making situation. This study explores some aspects of a psychometric scaling technique called *paired comparison*, which is used to evaluate decision-making strategies.

For several generations psychologists have been developing and applying methods for ordering preferences. The method of paired comparison (Bock & Jones, 1968; David, 1988; Edwards, 1957; Fechner, 1860; Guilford, 1954; Kendall & Gibbons, 1990; Thurstone, 1927; Torgerson, 1958) is a well-developed and established psychometric method for ordering elements of a given set of items. The method reduces every choice to a simple comparison of two items. Presumably, a choice between an environmental public good and a private good or sum of money would incorporate a participant’s notion of aesthetic, bequest, and other values difficult to assess in the market. The advantage of the paired comparison technique is that for certain market situations or contexts, it may be possible to develop standard, ordinaly-ranked sets of goods or monetary values. Then, with this information non-market (public) goods could be ranked on a continuum of private goods of known monetary value by simple and relatively inexpensive computerized comparison experiments such as the study presented here. Uses for this type of ranking range from policy making efforts to community consensus building and planning.

A unique aspect of the paired comparison technique is that it allows for apparent preference intransitivities or inconsistent choice patterns. Decision-making that is not transitive violates the transitivity assumption in neoclassical micro economic utility theory, but often reflects actual human behavior. Preference intransitivities can occur in the form of circular triads. An example of a circular triad or inconsistency could be shown as follows: A is preferred to B, which is preferred to C, which is preferred to A. Economists would consider this to be irrational behavior. To be consistent with preferences in this example, A should always be preferred to C.

However, apparent intransitivities could occur because there is no valid ordering of these three items, even when they differ markedly the items may depend on more than one characteristic, which would make it somewhat artificial to attempt to order the items on a linear scale.

Alternatively, the items may be so similar that it is not possible to distinguish reliably among them. Or, the chooser may key on different attributes for different comparisons, thus making inconsistent comparisons (e.g., Tversky, 1969).

Peterson et al (1994) applied the paired comparison method to a set of items consisting of private goods with known market values, individual sums of money, and non-market goods (i.e., public goods). An intriguing finding of the Peterson et al. study was that participants who were told their choices alone would determine which good would be distributed to the group showed higher valuations of the public goods than participants who were told their choices would be combined with all other participants' choices to determine which good would be distributed to the group. That is, there seemed to be a social responsibility effect, with those who had sole responsibility for determining the value of a public good giving it a higher value than those who had shared responsibility for determining its value. This social responsibility effect suggests that the paired comparison method may be sensitive to contextual factors in the data collection. If it were to be used to derive values for public environmental goods, it would be important to control for any such contextual effects.

Another potential contextual question explored in the current study was whether or not perception of the value of particular types of goods could be influenced by persuasive information given before or during the paired comparison task. For example, if the public goods in question involved environmentally sensitive assets such as a wildlife refuge and clean air, would an atmosphere promoting (i.e., priming for) environmental consciousness or indicating outrage over environmental degradation bias the valuations of the public goods toward higher figures? Such a question is important if the paired comparison method were to be employed to quantify the value of damaged public goods in a liability suit, or to assess the value of damage to natural resources

such as soil and water. In social psychology, persuasive information, if successful, is considered to cause a priming effect. Stated another way then, would priming environmental attitudes affect the perceived value of public goods?

The current study examined contextual influences on paired comparison assessment of the value of environmental public goods (Clarke, 1996). One contextual factor was the social responsibility effect reported by Peterson et al. (1994); a participant was told either that his or her choices would determine the outcome for the entire group, or that his or her choices would represent one of many votes that would determine a collective outcome. The other contextual factor was priming: a neutral prime or very blatant editorials deriding environmental alarmists or warning of the dangers of environmental degradation were given to research participants immediately before they performed the paired comparison task. If the values derived from the paired comparison survey should differ significantly according to which prime the research participant was given to read, then it could be concluded that context matters. This would imply that the psychometric method of paired comparison could potentially be biased by the context in which the study was given. After the paired comparison task, participants were also asked about their environmental attitudes. Should the priming effects be powerful enough to influence the attitudinal items but not affect the valuations derived from the paired comparison procedure, this would provide evidence that the method is robust with respect to priming effects.

Method

Participants and Design

Participants were 460 university students (203 males, 256 females, and one research participant who provided no gender information) at Colorado State University. Participants ranged in age from 19 to 50 years ($M = 20.99$, $SD = 4.06$). A 2x3 between-subjects design shown in Table 1 was used consisting of two social responsibility scenarios (shared responsibility for each choice outcome versus sole responsibility for each choice outcome) and three primes (negative/anti-environment, neutral, and positive/pro-environment).

insert Table 1 about here

Procedure

Participants entered a 25'x25' (7.62m x 7.62m) laboratory room and sat at one of 12 computer stations. They were asked to read an introduction to the study, one of the three primes and one of the two social responsibility scenarios. Research participants then began the interactive computer program which presented one pair of goods or a good and a sum of money on only one line of the computer screen. The participant selected the preferred good or sum of money by pressing the left or right arrow key. The program then presented the next randomized pair until all 108 pairs $\frac{1}{2} [n(n-1) - n^{\$}(n^{\$} + 1)]$ had been presented (in the interest of time, sums of money were not paired with other sums of money since it was assumed that any individual when presented with a choice between two sums of money would prefer the larger amount). Four private goods and five public goods, shown in Table 2, were used. The terms in parentheses in Table 2 were the actual words presented on the computer screen. Nine sums of money also used included \$9000, \$1000, \$700, \$500, \$300, \$100, \$50, \$25, and \$1.

Insert Table 2 about here

The goods and scenarios used in this study were designed specifically for the undergraduate university student in the hopes that the paired comparisons they were being asked to choose between and the social responsibility scenarios they were asked to assume when making choices, would be somewhat relevant and realistic for the research participants.

Each research participant had the descriptions of the goods, one of the priming editorials, and one of the social responsibility scenarios in front of him or her during the paired comparison

survey and was free to refer to them while doing the survey. The primes were 250-word statements. The *negative prime*, derived from Simon (1990), decried claims that humans are depleting and contaminating our natural resources and stated that with economic growth the environment was actually in better shape than in earlier centuries. The *neutral prime*, derived from Hopkins and Heady (1962), called for accurate use of accounting principles regardless of the type of resource being used. The *positive prime*, derived from McKenzie-Mohr and Oskamp (1996), decried the abuse of natural resources and encouraged protection of the environment as a high priority (see appendix A for primary scripts). In the *sole responsibility* scenario, participants were told to “assume that you and only you have been randomly selected from among the student body to make the choice, and that if you choose the private good or amount of money, it will be given to each student, including you.” In the *shared responsibility* scenario, participants were told to “assume that you and all other students are being asked to choose which of the alternatives they prefer to receive, and that if the majority chooses the private good or amount of money, it will be given to each student, including you.”

The computer program was also designed to detect errant pairs (i.e., intransitivities in preferences, also known as “circular triads”). Upon completion of the paired comparison program, the computer program asked the research participant a series of questions about the way he or she approached the paired comparison task, his or her perspectives and attitudes toward the environment, his or her political orientation, and basic demographic questions.

Results

Preference Scores and Dollar Values

The primary dependent measure was a dominance score for each good or sum of money calculated by the computer program through tabulating and adding up all of the times a good (or sum of money) was chosen over another item. Linear interpolation was then used to derive dollar equivalent scales from the dominance scores. These derived scales represent relative values of goods that have no defined market value or no known monetary value. The scales produced with

paired comparison are essentially relative rankings of the goods that each research participant is asked to choose between.

Dominance scores and dollar equivalent scales for the two social responsibility scenarios are shown in Table 3, and those for the three primes are shown in Table 4. Separate MANOVAs were conducted for the private goods and the public goods, using the dominance scores from which the scales were derived as the independent measures, and using scenario and prime as the dependent variables. For the private good dominance scores, none of the factors nor their interactions produced significant Hotellings values. In other words, the research participants were not influenced by the primes or scenarios of social responsibility when they chose private goods in the paired comparison survey. However, when public goods were examined, other effects became apparent.

Insert Tables 3 and 4 about here

For the public goods dominance scores, the social responsibility scenarios produced significant differences, Hotellings value = .03, $F(5,450) = 2.67$, $p = .02$. Specifically, the sole responsibility for a shared outcome scenario showed a statistically significant higher mean dominance score ($M = 11.04$) than the shared responsibility for a shared outcome scenario ($M = 10.69$), which is consistent with earlier studies done by Peterson et al. (1995). In univariate F tests, *clean air* had mean dominance scores of $M = 12.82$ for sole responsibility and $M = 12.02$ for shared responsibility, $F(1,454) = 4.71$, $p = .03$. *Recycling* had mean dominance scores of $M = 10.64$ for sole responsibility and $M = 9.68$ for shared responsibility, $F(1,454) = 5.26$, $p = .02$. No other univariate tests were significant. Differences across prime for each of the public goods were not significantly different.

When comparing the scales for both of the social responsibility scenarios it is interesting to note that none of the goods was preferred over \$1000. *Clean air* and *wildlife* were the highest

valued goods in both scales but their order was reversed from one scale to the next. The shared responsibility scenario shows that *wildlife* was still preferred above all other goods and sums of money below \$1000, but \$700 was preferred more than *clean air*. *Clean air* and *recycling* were clearly preferred less in the shared scenario scale when compared to the sole scenario scale. *Clean air*, *wildlife*, *recycling*, and *greenbelt* were the top four goods in the sole scenario scale, whereas *wildlife*, *clean air*, *greenbelt*, and the *airline ticket* were the top four goods in the shared scenario scale.

Intransitivity

As discussed earlier, preference intransitivity occurs in the form of circular triads, such as $A > B > C > A$. The computer program tabulated the number of circular triads for each participant. In total, the average number of circular triads was 18.40 ($SD=15.31$), or 17% of all choices presented, with a range of 0 to 100. A 2x3 ANOVA on circular triads by gender yielded a significant difference, $t=-3.09$, $p = .00$. The average number of circular triads was 20.30 ($SD = 17.16$), range 1 to 100 for females and 16.01 ($SD = 12.27$), range 0 to 81, for males.

Debriefing Questions

Evaluation of the debriefing questions following the paired comparison procedure was performed using 2 (scenario) by 3 (primes) analyses of variance with Scheffe' tests ($p < .01$) used to explore differences among more than two means. The first part of the debriefing questions asked the research participant to rate on a 7-point scale from "*not needed at all*" to "*needed very much*" their opinion about each good in the survey. The second part of the debriefing questions asked the research participant to respond to additional questions using a 7-point scale which ranged from "strongly disagree" to "strongly agree." Eight final questions were asked to obtain demographic information of which none showed significant differences in the mean ratings across scenario or prime.

A significant difference for scenario appeared for only one question: the need for *recycling* in the sole scenario produced a higher mean of 5.56 (SD = 1.51) as compared to 5.24 (SD = 1.60) for the shared scenario, $F(1,458) = 4.79$, $p = .03$.

In terms of the influence of prime, significant differences in mean ratings were found for the three debriefing questions shown in Table 5.

Insert Table 5 about here

The greatest number of statistically significant results came from examining gender differences on the debriefing items with independent t-tests (two-tailed) as shown in Table 6. For example, women reported a higher need for recycling and clean air than did men, and tended to have stronger pro-environmental beliefs.

Insert Table 6 about here

Discussion

The results suggest that the paired comparison technique can be used to derive relative dominance/preference among the goods. But what do the derived values mean? The private goods in the scales for both social responsibility scenarios (shown in Table 3) received almost identical dollar equivalent values for *entertainment*, *clothes*, and *airline ticket*. The *meal* varied by only a two-dollar difference between the two scales. This result is to be expected since all of these goods were given specific market values and are commonly bought and sold in the market place. Research participants' average dominance scores for these goods did not vary much across the two scales because they were private goods with known values. Since the derived values of the private goods are fairly close to their stated market value, the derived values probably represent approximate market value modified by special considerations of the participants. In

both of the social responsibility scales, the *meal* and the *entertainment tickets* were valued higher than their stated market value at the start of the experiment. These two goods were probably considered to have some value over and above the stated market value. Perhaps it was the pleasant psychological value of social interaction that occurs with the consumption of these goods, or simply a willingness to pay above market value to ingest a favorite food or enjoy one's favorite commercial entertainment. On the other hand, the *clothing certificate* and *airline flight voucher* were valued somewhat less than their stated market values, perhaps because they represented items that participants felt could be purchased at a discount without the voucher.

A critical question for the paired comparison technique is whether the derived dominance scores represent an analog of the value of the environmental public goods. If the method approximates the market value of the private goods, does it also approximate the perceived economic value of the public goods that have no stated market value? One approach to answering this question is to examine correlations between derived dominance scores from the paired comparison exercise and stated need for the goods in the debriefing questions, as shown in Table 7. With the exception of the *meal*, all correlations between the dominance scores and attitudinal expression of "need for" the good in the debriefing questions are above .50. The public good correlations are all above .60, suggesting that the dollar value derived from the dominance score is at least moderately associated with subjective need or personal value. *Greenbelt corridor* had the highest correlation with attitudinal "need".

Insert Table 7 about here

Social Responsibility

The effect of the two social responsibility scenarios in this study replicated an effect found by Peterson et al. (1996). Specifically, both studies found that assigning each participant sole responsibility for valuing the goods led to higher values for public goods than did assigning

participants to share in valuing the goods. According to the scenario descriptions in the shared responsibility scenario, each research participant had little effect on the overall outcome and may therefore have felt little concern or responsibility for the effect of his or her choices on others. The choices made may have been perceived as affecting only oneself.

With the sole responsibility scenario, perception on the part of the research participant appeared statistically to be quite different. When in a role of “representative” for the public interest, people tended to use a different “utility function” than when in the role of individual consumer. When compared with shared responsibility, sole responsibility for choices among environmental public goods tended to increase the relative value of the environmental public goods. Sen (1977) suggests that these two different perspectives represent a dual preference ordering that “permits us to distinguish between what a person thinks is good from the social point of view and what he regards as good from his own personal point of view” (p. 336). Sagoff (1988) argues that our role as consumer differs fundamentally from our role as citizen.

With the exception of the *wildlife refuge*, all of the public goods (see Table 3) in the sole scenario were given higher values than those same goods in the shared scenario. Perhaps the *wildlife refuge* conveyed an image or symbolism that appealed to the “fear or uncertainty of loss” for the shared scenario research participant. Perhaps the research participant perceived in a shared social responsibility scenario that a good with the characteristics of a wildlife refuge (i.e., defenseless animals and a unique habitat) might need some extra consideration and thus be chosen above higher monetary values.

Also, shown in Table 3, *bicycle trails* were the lowest valued public good, ranked in both scenarios below the *airline ticket*. Perhaps this was because *bicycle trails* connotes too specific a type of use that might exclude some people. The definition of this good might have been too vague. On the other hand, there are many existing bicycle trails in the community, such that participants may have viewed additional trails as having marginal value.

Priming

This study found that values for the goods were not influenced by priming. It was expected that due to the fairly strong pro-environmental perspective of the research participants, as reflected in their responses to the debriefing items, the pro-growth editorial might lead to anger or resentment on the part of the participants. If such a reaction caused some participants to value the public goods more highly, the negative prime should show higher values for the public goods; examination of these values (see Table 4) showed no differences across the three priming conditions. Thus it appears the primes had no effect on preferences for public goods and the method is robust with respect to priming.

It is particularly noteworthy that the priming manipulations were powerful enough to influence responses to the debriefing questions at the end of the exercise (the negative prime yielding slightly more negative views toward environmental public goods and the positive prime slightly more positive perspectives), but did not influence the preference scores. This finding suggests that in a litigation proceeding or policy development procedure, the paired comparison method could derive public good values that are independent of biasing persuasive arguments, even though the persuasive attempts may be strong enough to influence attitudes.

Gender Effects

In general, responses to the debriefing questions showed that women on average demonstrated more concern for the environment regardless of the prime condition to which they were randomly assigned to, and men appeared to be more concerned with money. These results are consistent with previous research that found women to be more environmentally conscientious (e.g., Blocker & Eckberg, 1989; Hamilton, 1985; Steger & Witt, 1989). Although gender did influence environmental attitudes, it is important to note that gender did not affect the valuation of public goods. The contrasts shown between the scales in Tables 3 and 4 represent the two scenarios irrespective of gender. The method of paired comparison appears to be robust with respect to gender differences. Moreover, the dominance scores seem to be independent of gender

even though men had fewer intransitivities, implying that the derived values may also be robust with respect to intransitivities among a few pairs of goods.

Conclusions

The strength of this type of application is that it allows for human uncertainty and indecision. The paired comparison computer program used for this study does force the research participant to make a choice when presented with a pair of goods. We are not, in spite of neoclassical economic theory assumptions, perfectly rational creatures. This technique allows for imperfect, human decision-making.

Even though the method of paired comparison has been used extensively in the field of psychology, its application to economic phenomena such as valuing goods that are not bought and sold in the market does not enjoy such a long life. The biggest liability with this technique is that the scale produced and the resulting interpretation of dollar values for non-market, public goods should be interpreted strictly in terms of those goods and sums of money with which the scale was created. Depending on what goods and sums of money one chooses to use in the paired comparison survey, resulting interpolated dollar values for the non-market goods may vary.

However, the *relative* position of a public good in the scale and in relation to other goods and sums of money in the scale is the technique's strong point. Regardless of the actual sums of money used, or even the private and public goods used, one could interpolate a relative dollar value for a particular public good bracketed between private goods or sums of money and use that relative dollar value for decision-making. The ability to "discover" relative values for goods that are not bought and sold in the traditional market setting could have significant and useful policy implications, if used carefully. Being able to assign a *relative value* to a public good makes it more difficult to say "what can't be easily measured really doesn't exist." (Smith, 1972).

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Table 1 Experimental Design

TYPE OF PRIME	RESPONSIBILITY	
	sole	shared
negative environmental prime	<u>78 participants</u>	<u>79 participants</u>
neutral prime	<u>74 participants</u>	<u>77 participants</u>
positive environmental prime	<u>73 participants</u>	<u>79 participants</u>

Table 2. Descriptions of Private and Public Goods

PRIVATE GOODS

1. A meal at a Fort Collins restaurant of your choice, not to exceed \$15. **(Meal)**
2. Two tickets and transportation to one of the following:
 - A) A Colorado ski are of your choice.
 - B) A concert of your choice in Denver – contemporary or classical.
 - C) A Broncos, Rockies, or Nuggets game.
 - D) A cultural event of your choice at the Denver Center of the Performing Arts.Estimated value: \$75 **(Entertainment Tickets)**
3. A non-transferable \$200 certificate for clothing at a Fort Collins store of your choice. **(Clothes)**
4. A non-transferable certificate for you to make \$500 worth of flights on an airline of your choice. **(Airline Flight)**

PUBLIC GOODS

1. Open, undeveloped area one mile wide, from Fort Collins to Loveland that preserves wildlife habitat and maintains a natural greenbelt to separate areas of rapid urban expansion. **(Greenbelt Corridor)**
2. An interconnecting, well maintained set of bicycle trails in Fort Collins that would enable safe and scenic access to campus from all parts of town. **(Bicycle Trails)**
3. A program whereby all CSU trash is sorted to recover all recyclable materials before the trash is sent to the landfill, using paid CSU students to do the sorting. **(Recycling)**
4. CSU purchase of 2,000 acres in the mountains west of Fort Collins to be used as a wildlife refuge for animals native to Colorado. **(Wildlife Refuge)**
5. A cooperative arrangement between CSU, local business groups, and the citizens of the community that would ensure that Fort Collins air and water would be at least as clean as the cleanest 1% of the communities in the US. **(Clean Air)**

Table 3. Derived Scales for Social Responsibility Scenarios

sole	<i>dominance</i>		shared	<i>dominance</i>	
scenario	<i>score</i>	<i>dollar equiv.</i>	scenario	<i>score</i>	<i>dollar equiv.</i>
\$9,000	15.09	\$9,000	\$9,000	14.81	\$9,000
\$1,000	13.08	1,000	\$1,000	13.03	1,000
clean air	12.28	737	wildlife	11.99	720
wildlife	11.85	711	\$700	11.66	700
\$700	11.66	700	clean air	11.47	556
recycle	10.21	500	\$500	10.32	500
\$500	10.16	500	greenbelt	10.11	354
greenbelt	10.15	361	airline	9.38	328
airline	9.26	329	recycle	9.22	322
bicycle trails	8.45	300	\$300	8.60	300
\$300	8.44	300	bicycle trails	8.15	137
clothes	6.33	110	clothes	6.60	111
entertainment	6.06	105	entertainment	6.23	105
\$100	5.79	100	\$100	5.93	100
\$50	3.95	50	\$50	4.06	50
meal	2.79	28	meal	2.55	26
\$25	2.46	25	\$25	2.44	25
\$1	0.13	1	\$1	0.19	1

Table 4. Derived Scales for Primes

negative prime	dominance score	<i>dollar equiv.</i>	neutral prime	dominance score	<i>dollar equiv.</i>	positive prime	dominance score	<i>dollar equiv.</i>
\$9,000	15.27	\$9,000	\$9,000	14.60	\$9,000	\$9,000	14.42	\$9,000
\$1,000	13.39	1,000	\$1,000	12.77	\$1,000	\$1,000	12.54	1,000
wildlife	12.38	726	wildlife	11.45	708	clean air	12.13	752
clean air	12.12	711	clean air	11.32	700	wildlife	11.9	738
\$700	11.93	700	\$700	11.32	700	\$700	11.28	700
greenbelt	10.78	515	\$500	9.99	500	greenbelt	10.24	516
\$500	10.46	500	greenbelt	9.43	343	\$500	9.91	500
recycle	10.27	348	recycle	9.30	338	recycle	9.63	351
airline	9.59	325	airline	9.26	338	airline	9.05	330
\$300	8.84	300	bike trails	8.65	316	\$300	8.22	300
bike trails	8.41	141	\$300	8.21	300	bike trails	7.88	139
clothes	6.52	109	entertainment	6.42	112	clothes	6.47	114
entertainment	6.32	106	clothes	6.40	112	entertainment	5.82	102
\$100	5.97	100	\$100	5.72	100	\$100	5.68	100
\$50	4.08	50	\$50	3.92	50	\$50	3.86	50
meal	2.92	29	meal	2.56	27	meal	2.54	28
\$25	2.55	25	\$25	2.40	25	\$25	2.28	25
\$1	0.20	1	\$1	0.17	1	\$1	0.1	1

Table 5. Mean Ratings of Debriefing Questions – Significant Comparisons Among Primes

<i>Question</i>	<i>Prime/Mean</i>	<i>F-statistic</i>	<i>Significance</i>
[scale: 1=strongly disagree, 7=strongly agree]			
<i>“Environmentalists have too much influence in public policy decisions”</i>	neutral/ 3.25 > positive/ 2.65	F(2,457)=5.92,	p=.00
<i>“In considering each of the PUBLIC goods, I found myself thinking about how they would be paid for”</i>	neutral/ 3.50 & negative/ 3.52 > positive/ 2.90	F(2,457)=5.75,	p=.00
[scale: 1=not needed at all, 7=needed very much]			
value of <i>“bicycle trails”</i> to me	neutral/ 4.59 > negative/ 4.11	F(2,457)=3.95,	p=.02

Table 6. Mean Ratings of Debriefing Questions – Significant Comparisons Among Gender

Question	Mean/SD	t-statistic
ALL ITEMS SIGNIFICANT AT THE .00 LEVEL		
<u>[scale: 1=not needed at all, 7=needed very much]</u>		
value of “ <i>recycling</i> ” to me	females = 5.66/1.46 males = 5.08/1.61	$t = -3.96$
value of “ <i>clean air</i> ” to me	females = 6.10/1.22 males = 5.70/ 1.52	$t = -3.03$
<u>[scale: 1=strongly disagree, 7=strongly agree]</u>		
“ <i>Environmentalists have too much influence in public policy decisions</i> ”	females = 2.77/ 1.36 males = 3.18/ 1.67	$t = 2.87$
“ <i>I tried to be consistent in my choices</i> ”	females = 5.32/ 1.26 males = 5.74/ 1.10	$t = 3.77$
“ <i>I often chose a particular PRIVATE good because I knew that I could sell it</i> ”	females = 2.21/ 1.48 males = 2.73/ 1.80	$t = 3.29$
“ <i>I do not think the problem of depletion of natural resources is as bad as many people make it out to be</i> ”	females = 2.30/ 1.42 males = 2.79/ 1.75	$t = 3.22$
“ <i>Science and technology will eventually solve our problems with pollution, over-population, and diminishing resources</i> ”	females = 2.79/ 1.59 males = 3.43/ 1.71	$t = 4.05$
“ <i>I would favor an industry wanting to expand its production even if it needed to add to the amount of pollution in my community in order to expand economically</i> ”	females = 2.11/ 1.31 males = 2.53/ 1.47	$t = 3.14$

Table 7. Correlations Between Attitudinal Expressions of Preference and Actual Dominance Scores for all Goods

<i>Good and Attitude Question</i>	<i>Mean</i>	<i>SD</i>	<i>Correlation (r^2)</i>
Greenbelt Corridor	10.60	4.45	
“need for”	4.92	1.70	<u>.73</u>
Wildlife Refuge	12.46	3.84	
“need for”	5.47	1.52	<u>.70</u>
Recycling	10.15	4.46	
“need for”	5.40	1.56	<u>.69</u>
Bicycle Trails	8.69	4.26	
“need for”	4.28	1.65	<u>.68</u>
Clean Air Arrangement	12.41	4.00	
“need for”	5.93	1.37	<u>.65</u>
Airline Travel Voucher	9.68	3.05	
“need for”	4.09	1.75	<u>.57</u>
Clothing	6.74	2.67	
“need for”	4.07	1.57	<u>.55</u>
Entertainment Ticket	6.45	2.81	
“need for”	4.07	1.51	<u>.54</u>
Meal	2.79	2.49	
“need for”	3.62	1.83	<u>.47</u>

APPENDIX A – Priming Editorials

(negative/pro-growth prime)

It seems as if we are continually confronted with alarmist claims that humans are depleting and contaminating our natural resources, and uninformed claims that economic progress is bad for the environment and bad for our quality of life. Yet, a careful look at the scientific data suggests an alternative and more optimistic view.

It is clear from scientific data, for example, that economic life in the United States and the rest of the world has been getting better rather than worse during recent centuries and decades. Moreover, there is every reason to believe that these trends can be sustained indefinitely.

The best economic data, in fact, indicate that natural resources have actually become LESS scarce over this same time, right up to the present. Economic growth allows us to find more and more resources and more and more cheaper substitutes for resources.

What about the consequences of this growth for the environment? People have always had to dispose of their waste products so as to enjoy a healthy and pleasant living space. But on average we now live in a less dirty and more healthy environment than in earlier centuries. Major improvements in the quality of water and air have been clearly documented, and human life expectancy – an indication of the quality of the environment – continues to increase. Human progress actually carries with it a better environment and more resources for all to enjoy.

Source: Simon, J. (1990).

(neutral prime)

Accounting involves principles which are standard for all businesses ranging from a small farm or ranch to a huge corporate business. While the certain elements may differ among regions and type of business, the basic principles of accounting do not. For example, accounting principles used for resources are the same whether for a farm or a recreational area or an industrial business, except the latter usually employs much greater detail in records. It is important to learn the general concepts, rather than the pure routine of how to make bookkeeping entries in a set of accounts that cover the relevant resources and expenses. Changes in any business call for variations in the records to be kept and in the types of investment, depreciation, receipts, and other transactions to be treated. The general principles which are applicable to many types of activities provide a basis for handling any changes. The bookkeeper who is not able to convert to a new form of record keeping is doomed.

If a standard or abbreviated account book is used, with main emphasis on income computation and tax payments, some supplemental forms may need to be added to it to account for changes in resources, particularly if one wishes to determine partial returns to specific resources used in production and other simple quantities which are useful in making decisions.

Source: Hopkins, J.A. & Heady, E.O. (1962).

(positive/pro-environmental)

The human assault on the environment is widespread. In three critical areas – forests, soil, and water – human activities are not sustainable. Results from a United Nations study on tropical deforestation indicate that the rate of deforestation has increased by 50% during the 1980s, to approximately 41.7 million acres per year – an area about the size of the state of Washington. Similarly, an area roughly equivalent to India and China combined has experienced moderate to severe soil degradation since the end of World War II.

As for water, some regions have an abundance of water but some 230 million people live in areas with severe water shortages. These shortages are complicated further by the contamination of fresh water supplies. In developing countries, 95% of sewage is released into waterways untreated. Since 1945, three times as many people (150 million) have died from

drinking contaminated water as died in both World Wars combined. Fresh water is increasingly contaminated by industrialization, deforestation, agricultural practices, and human settlements.

Because of human activity, the world loses unique plant and animal species every day. Neither humans nor other species can survive if people continue to plunder the Earth's resources the way we are doing today. We must act now to avert global environmental problems. Protection of the environment must become one of our highest priorities.

Source: McKenzie-Mohr, D. & Oskamp, S. (1996).